

INTERIM MANAGEMENT MEASURES FOR THE RED SEA URCHIN
IN SOUTHEAST ALASKA FOR THE 1992 SEASON



By

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FISHERY OUTLOOK

Stock Assessment

Assessment surveys were conducted by Department of Fish and Game divers in southern Sitka Sound from September 11, 1991 to March 4, 1992. Results from these surveys indicate sufficient quantities of red sea urchins to provide for a commercial fishery in 1992. These surveys were more extensive than those made last year as part of a commercial test fishery (Woodby 1991), and indicate a larger population than estimated last year.

Commercial Fishery

The commercial fishery will open on April 1, 1992 in the Sitka area and will close no later than December 31, 1992. The quota for this fishery is 632,000 urchins (approximately 450,000 lbs).

Initially there will be two fishing areas, and both areas will be open simultaneously. Fishing areas, or portions of fishing areas, will be opened and closed by Emergency Order and announced in News Releases. In addition, three areas within the overall fishery boundaries will be closed to fishing. Two of these three areas will remain closed for the duration of the 1992 fishery; a third area may be opened to fishing when department surveys are completed.

These five areas, designated as areas A, B, C, D, and E (Figures 1 and 2), are described later under *DEFINITION OF FISHERY MANAGEMENT AREAS*. The experimental fishing areas are necessary as part of a four year study being conducted by the department in Sitka Sound. The purpose of this study is to conduct research to support the development of a red sea urchin management plan for Southeast Alaska. This study is being funded in part by the Pacific States Marine Fisheries Commission (PSMFC).

Areas A and area C will open at 12:01 a.m. on April 1, 1992. Area A will be managed for a harvest quota of 590,000 urchins or approximately 420,000 lbs. This area encompasses the larger part of southern Sitka Sound, the Necker Islands, and contiguous waters, excluding areas B, C, D, and E. Area C is an experimental fishing area that includes waters adjacent to the shoreline of Korga and Ulmoi Islands. The quota for Area C is 42,000 urchins (30,000 lbs.). The area will be closed when the department determines that the experimental objectives have been met.

Area B, an experimental fishing area, is not scheduled to open at this time. Part of this area may be opened during the 1992 season, depending on when department surveys of this area can be completed. A small portion of this area will remain closed indefinitely as an experimental control site.

Area D will remain closed indefinitely as a study site. A recent colonization of this area by sea otters has been noted by department divers. This site offers a unique opportunity to observe and monitor the effects of otter predation on sea urchins. This information may be of critical importance to future red sea urchin fisheries in Southeast Alaska. Area E will remain closed indefinitely as an experimental control site.

Once an area has been opened by emergency order, openings will continue from 12:01 a.m. Sunday through 12:00 noon, Thursday each week until the quota is taken and the fishery closed by emergency

order. The fishery will be managed with the miscellaneous shellfish permitting system (5AAC 38.062). To avoid local over harvesting, it may be necessary to close portions of the open areas prior to attainment of the overall quotas if catches in those areas are excessive. Urchins of any size may be taken. The only legal gear for harvest is hand picking (5AAC 38.051). Divers must maintain accurate and complete logbooks showing harvests and locations. Logbooks are available from the department office in Sitka (Figure 3). Completed logbooks must be turned in with each sale of product.

INTRODUCTION

This document specifies how the Alaska Department of Fish and Game (department) will manage the commercial fishery for red sea urchins (*Strongylocentrotus franciscanus*) in Southeast Alaska under the authority of Alaska Statutes (SEC. 16.05.060) and regulations of the Alaska Board of Fisheries (5AAC 38.062) during the 1992 season. This document also specifies management objectives that will guide department actions, identifies specific management measures that will be used to achieve those objectives, and presents the fishery outlook for the 1992 season. These management measures will serve as a basis for subsequent years, but are subject to change as the fishery evolves and as our understanding of the red sea urchin resource improves.

GOAL AND OBJECTIVES

The management goal for the Southeast Alaska commercial red sea urchin fishery is to maximize the overall long-term benefit of the red sea urchin resource to the State of Alaska consistent with responsible stewardship for conservation of red sea urchin populations and their habitats. To attain this goal, four objectives are to be met concerning biological conservation, subsistence, sustainable and orderly fisheries, and adaptive management and research. For the purposes of interim management, the fishery will be limited both in area and allowable harvest levels.

Biological Conservation Objective

The biological conservation objective is to ensure the long-term reproductive viability of red sea urchin populations and the quality and availability of their habitats. This objective takes precedence over other objectives that address social, economic, management, and research considerations.

To ensure the long-term reproductive viability of red sea urchin populations, management must prevent recruitment overfishing, in which spawning stocks are reduced by fishing below a level that ensures adequate production of young red sea urchins to provide future recruits to the fishery. To maintain the quality and availability of red sea urchin habitat, harvesting methods that may destroy or damage habitats required by red sea urchins shall be prohibited. Last, harvesting methods which substantially impact other species shall not be permitted.

Subsistence Objective

The subsistence objective is to ensure that red sea urchin harvest requirements by customary and traditional users in coastal communities are met, as required by law. To meet this objective, management must prevent deleterious effects of commercial fisheries on the availability of red sea urchins to subsistence users. Area closures, reduced catch quotas, or other restrictions on commercial harvest may be used to ensure that traditional subsistence users are not adversely impacted.

Sustainable and Orderly Fishery Objective

The sustainable and orderly fishery objective is to ensure the conduct of manageable, steady-paced red sea urchin fisheries that provide stable employment opportunities and sustained supplies of a high quality product to seafood markets. To meet this objective, management measures will be established to maintain sustainable fisheries over the long-term and prevent "boom-and-bust" or "derby-type" fisheries. Reporting systems are specified to provide accurate and timely data on catch for each area. As the need arises, other regulations to promote orderly fisheries may be adopted.

Present funding levels do not allow the commitment of staff and other resources of the department to manage region-wide fisheries. For this reason, interim management will provide for exploratory fisheries on only a limited basis.

Research Objective

The department is conducting a four year study of red sea urchins in Sitka Sound from July 1 of 1991 to July 1 of 1995, funded in part by the Pacific States Marine Fisheries Commission (PSMFC). Detailed plans for this work will be available later this year as a project proposal to develop a red sea urchin management plan for Southeast Alaska.

The research objective is to conduct a fishery research program that contributes information on red sea urchin biology and population dynamics pertinent to management. This growing information base will provide increasingly better data on stock abundance and distribution in order to determine the population available for harvest.

It is also important to develop an understanding of population growth as a function of stock size in order to promote sustained yield, and to determine threshold population levels below which stock recovery is uncertain. The experimental fishing areas will be managed to remove large portions of the available urchin resource so we may observe the response of the urchin populations to commercial harvest. The department will also conduct research to estimate population parameters necessary to establish sustainable harvest levels, and it will monitor changes in urchin quality over time to establish optimal fishing seasons. This research will first be conducted in Sitka Sound and, depending on the success of this work, the methodology will be transferred to other areas of Southeast Alaska.

DEFINITION OF FISHERY MANAGEMENT AREAS

The five separate fishery management areas, designated as areas A,B,C,D, and E, (Figures 1 and 2) are described as follows:

Area A includes the waters of Sitka Sound and the Necker Islands south of a line from a point on the northern entrance of Deep Inlet at 56°59'35"N latitude, 135°18'43"W longitude to the easternmost tip of Long Island, to the westernmost tip of Long Island to Shoals Point, and east of the longitude of Shoals Point (135°38'10"W), and north of 56°45'00"N latitude near the southern entrance to West Crawfish Inlet, except that this area does not include the waters of Area B, Area C, Area D, and Area E as described below.

Area B includes waters adjacent to the Taigud Islands out to -60 feet mean lower low water (MLLW).

Area C includes waters adjacent to Korga and Ulmoi Islands out to -60 feet MLLW.

Area D includes waters adjacent to Peisar Island out to -60 feet MLLW.

Area E includes waters out to -60 feet MLLW, and adjacent to Round Island and the reef immediately north and west of Round Island.

MANAGEMENT MEASURES

Permit/Reporting Requirements

Individuals intending to commercially harvest red sea urchins must first register their vessels and obtain harvest permits from an office of the department. Registrations will be valid for each fishing season. These requirements are in addition to the vessel license and interim-use permit which must be obtained from the Commercial Fisheries Entry Commission. These are current requirements for all miscellaneous shellfish fisheries conducted in state waters.

All commercial red sea urchin fishery participants must also maintain logbooks (Figure 3). As with registrations and permits, logbooks may be obtained from department offices in Southeast Alaska. Logbooks will permit the department to collect data on harvest distribution and to monitor stock response to commercial harvests. Logbooks will require catch statistics to be recorded on a daily basis for each location fished. Other information required includes the exact location of catch (to be indicated on the logbook chart), weight of catch, and time fished.

Completed logbooks must be returned to the department along with the department's copy of fish tickets. This means that each time a diver delivers their catch to a processor, they must be sure that the log is attached to the department's copy of the sales slip. To assure confidentiality of these records, processors will be required to seal the logbooks and sales slips obtained from individual divers in separate envelopes signed by the diver. It is the diver's responsibility to assure that this process is followed. Divers should

retain a copy of their logbooks as proof of compliance with this requirement. Failure to complete and surrender logbooks is sufficient cause to revoke a diver's harvest permit.

The harvesting of red sea urchins shall be confined to the following gear types:

1. SCUBA;
2. Tethered, umbilical, surface-supplied systems;
3. Skin/Free Diving without the aid of a breathing apparatus, or diving with a snorkel only.

Red sea urchins must be harvested by hand and transported to the surface in bags. A diver may use a rake no longer than 16 inches, possessing no more than six tines, each tine being no more than 5 inches long. Any means other than individually collecting red sea urchins by hand, placing them in bags, and air-lifting or buoying filled bags for surface collection is prohibited. Such lifting devices shall be used in such a manner that no rocks, mineral matter, aquatic plants, fish or other aquatic life except red sea urchins shall be disturbed or removed from the bottom.

Size Limits

No size limits will be imposed for urchins at this time because the catch quotas are considered sufficient to protect the stocks. Also, because the current market for urchin roe targets a narrow size range of 76 to 127 mm (3 to 5 inches), so urchins outside this range are likely to receive minimal harvest pressure. However, size limits may be instituted in the future. The biological basis for size limits is that large urchins provide a protective spine canopy for small juveniles (Tegner and Dayton 1977), so it is important to protect large red urchins by imposing a maximum size limit. Small urchins are needed for subsequent recruitment and may also need to be protected. Fishermen are, therefore, encouraged to leave small and very large urchins undisturbed.

Fishing Seasons

The general fishing season for red sea urchins will open on April 1, 1992. The fishery will continue until December 31, 1992, unless closed earlier by Emergency Order.

Weekly Openings

The red sea urchin fishery will be initially opened on Wednesday, April 1, 1992 at 12:01 a.m., and will continue until Thursday, April 2, 1992 at 12:00 noon. During subsequent weeks, and until closed, the fishery will open for 108 hours each week beginning at 12:01 a.m. on Sunday, and ending at 12:00 noon on Thursday. The weekly closure is important for orderly fishery management.

Subsistence Priority

Under this plan, the commercial fishery is expected to harvest no more than 2% of the red sea urchins in an area each year (see Catch Quotas, below). The fishery will be confined to areas south of Sitka where no conflict with the subsistence harvest of urchins is expected. In addition, no commercial harvest of urchins is planned in the area immediately surrounding the community of Sitka. Also, to prevent local depletion of urchins, the department will monitor fish ticket and logbook information, and may close parts of harvest areas to ensure even distribution of the catch.

Catch Quotas

Annual catch quotas for red sea urchins in Area A (Figure 1) will be set to achieve the biological conservation objective by preventing over fishing. Due to limitations in our understanding of sea urchin population dynamics in Southeast Alaska, yield assessments are based on a conservative application of surplus production models (Garcia et al. 1989). Application of surplus production models over several years carries the risk of fishery collapse if the assumptions upon which the model are based are grossly inaccurate (Koonce and Shuter 1987). For example, these models assume that recruitment will increase as virgin stocks are reduced to levels which are approximately one-half of the original biomass. This assumption is potentially overly simplistic. Evidence from southern California suggests that small urchins are more likely to survive if there are large numbers of adult urchins present to provide a protective spine canopy from predators (Tegner and Dayton 1977). There is also evidence that young of the year occur mostly under the spine canopy of adults in the test fishery area near Sitka (Woodby 1991). Due to this concern and additional uncertainties, the status of urchin stocks will be monitored on a regular basis, and intensively studied over the next four years.

A detailed description of the method used to apply surplus production models to estimate quotas for unexploited populations is available in Regional Information Report 1J90-31 (Imamura and Kruse 1990). In summary, the allowable harvest is measured in numbers of urchins, and is calculated as a product:

$$\text{Quota} = CF \times GF \times M \times P_0$$

where

CF = 0.4	scaling factor relating maximum sustainable fishing mortality to unexploited population size (e.g. Caddy 1986);
GF = 0.5	correction factor due to Garcia et. al (1989) to allow for errors in assumptions upon which the surplus production model is based;
M = 0.144	estimated instantaneous mortality rate for red sea urchins using method of Van Sickle (1977) as described by Woodby (1991) for the Sitka area; and
P ₀ = 20,463,000	virgin population size, taken as the lower bound of the one-sided 90% confidence interval.

The population of red sea urchins of southern Sitka Sound is considered a virgin population because the level of harvest (220,000 urchins) in 1991 was small, and only about 1% of the estimated population size this year.

Population size was estimated as:

$$P_0 = \text{Density} \times \text{Shoreline length (in meters)},$$

where density is the lower bound of the 90% confidence interval for the average number of sea urchins per linear meter of shoreline of available urchin habitat. Population density was estimated by divers observing urchin populations on strip transects extending perpendicularly from the shore to the 12 meter (40 foot) depth contour. Transect width was 1 meter, and 40 transects were completed for this area in September of 1991. These surveys were systematically distributed along shorelines in the proposed harvest areas. No allowance is made in the quota for populations below 12 meters depth because scientifically valid assessments of deep populations are not available.

For Area A the mean density was 137.4 urchins per meter, and the lower confidence bound on this estimate is 95.25 urchins per meter, which is 69.4% of the mean. The shoreline length is estimated as 214.8 km. The product of these terms (95.25 urchins per meter x 214,832 meters), P_0 , is 20,463,000 urchins. The product of the first three terms in the quota equation is 2.88%. This percentage harvest multiplied by the lower bound of the population size estimate results in a quota of about 590,000 urchins on an annual basis. This quota is 2.0% of the mean value of the population size estimate.

For Area C the mean density was 155.9 urchins per meter. The lower confidence bound on this estimate is 103.5 urchins per meter, which is 66.4% of the mean. The shoreline length is estimated as 2.7 km. The product of these terms (103.5 urchins per meter x 2,722 meters), P_0 , is 282,000 urchins. Area C is an experimental fishing area to be managed at a higher harvest than Area A, in the range of 10-20% per year. Based on a 15% harvest rate for Area C, the approximate quota for this area will be 42,000 urchins on an annual basis. This quota is about 10% of the mean value of the population size estimate.

The combined quota for Areas A and C is approximately 632,000 urchins. If Area B is also fished in 1992, the combined quota can be expected to increase accordingly.

Due to weather and sea conditions, not all areas may be accessible to commercial divers. Therefore, judgements were made regarding the area which was actually fishable when shoreline length was estimated. Also, protected bays and inlets are likely to have low densities of red urchins, and these areas were not included in estimates of available habitat. This approach leads to a conservative estimate of total population, and therefore a conservative harvest which will help to guard against local depletions.

Experimental Fishing Areas

Area C (Korga and Ulmoi Islands), will be managed as an experimental harvest area. This area will be managed for a higher harvest rate than that described for Area A, so the department may evaluate the effects of commercial harvest on the ability of sea urchins to repopulate, and ultimately, what rate of harvest is sustainable. The catch for Area C will be separately monitored, and this area will be closed when the experimental harvest objective of 10-20% of the lower bound of the population estimate has been met.

Area B (the Taigud Island group) will also be managed as an experimental harvest area. This area will remain closed until the department is able to complete dive surveys. Portions of Area B, not yet specified, may be opened during the 1992 season. Area B, if opened, will be managed for the experimental harvest objective of 10-20%, as described for Area C.

Area D (Peisar Island) will be managed as a sea otter predation study area and will remain closed indefinitely for research purposes. On March 5, 1992 department divers noted the recent colonization of this area by sea otters. Previous dive surveys in September, 1991 found no evidence of otters around Peisar Island. The department now has a unique opportunity to observe and monitor the progression of otter predation on sea urchin populations. Considering the currently expanding sea otter population in Southeast Alaska, information from this study may be of critical importance for the management of future red sea urchin fisheries in the region.

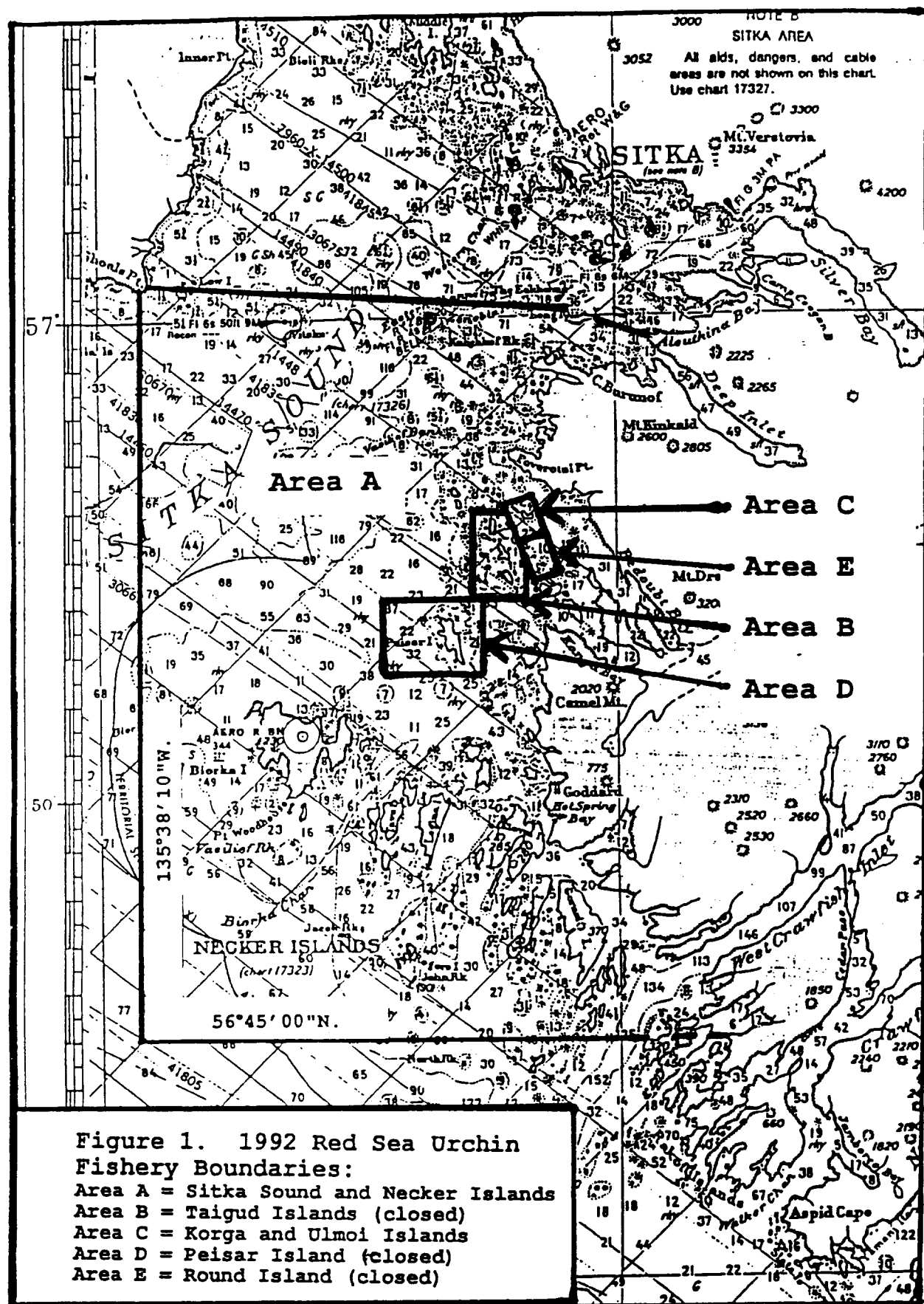
Area E (Round Island) and an unspecified portion of Area B (Taigud Islands) will remain closed indefinitely as unharvested control sites for research purposes.

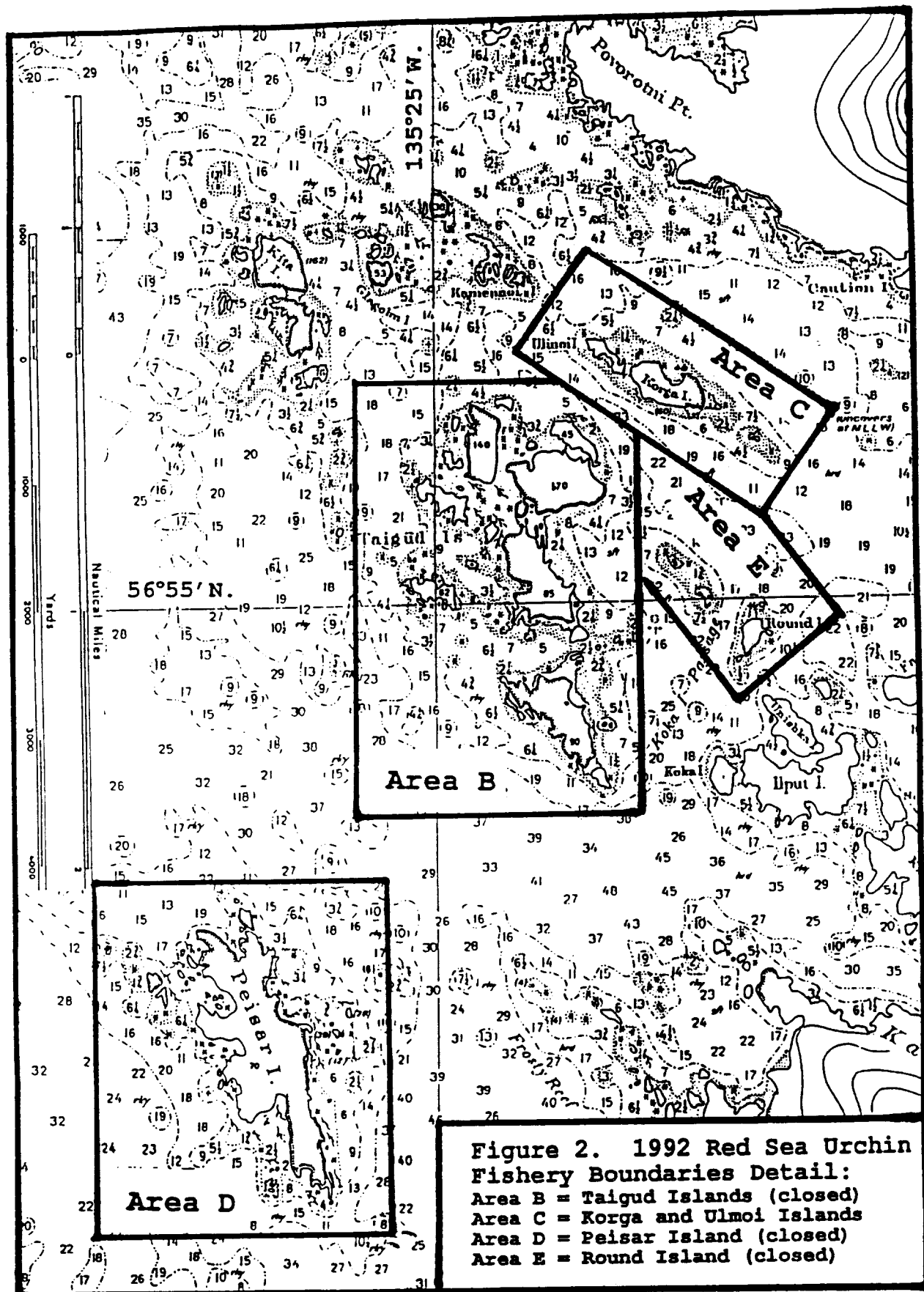
In-season Adjustments

Many factors may affect management's ability to meet the goals and objectives of this interim fishery management plan. The department may make in-season adjustments not described in this plan to insure that the goals and objectives are met. In-season management measures that may occur in this fishery include area closures to prevent local depletion of urchins, and area closures to prevent delivery of poor quality product to processors. For example, if harvest is excessive in local areas, portions of an area may be closed in order to distribute fishing more evenly throughout the open fishing area. Similar area closures may be implemented if excessive amounts of unusable products are harvested. The department will monitor deliveries for product quality, and urges fishermen to check product quality on the grounds before proceeding with harvests of large quantities of urchins.

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STATE OF ALASKA

SEA URCHIN HARVEST LOG

DEPARTMENT OF FISH AND GAME

Permit Holder

Vessel Name

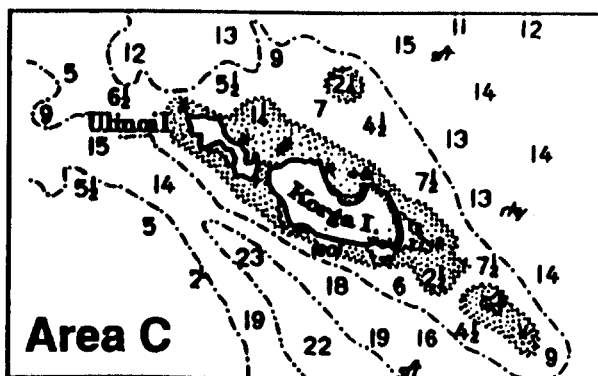
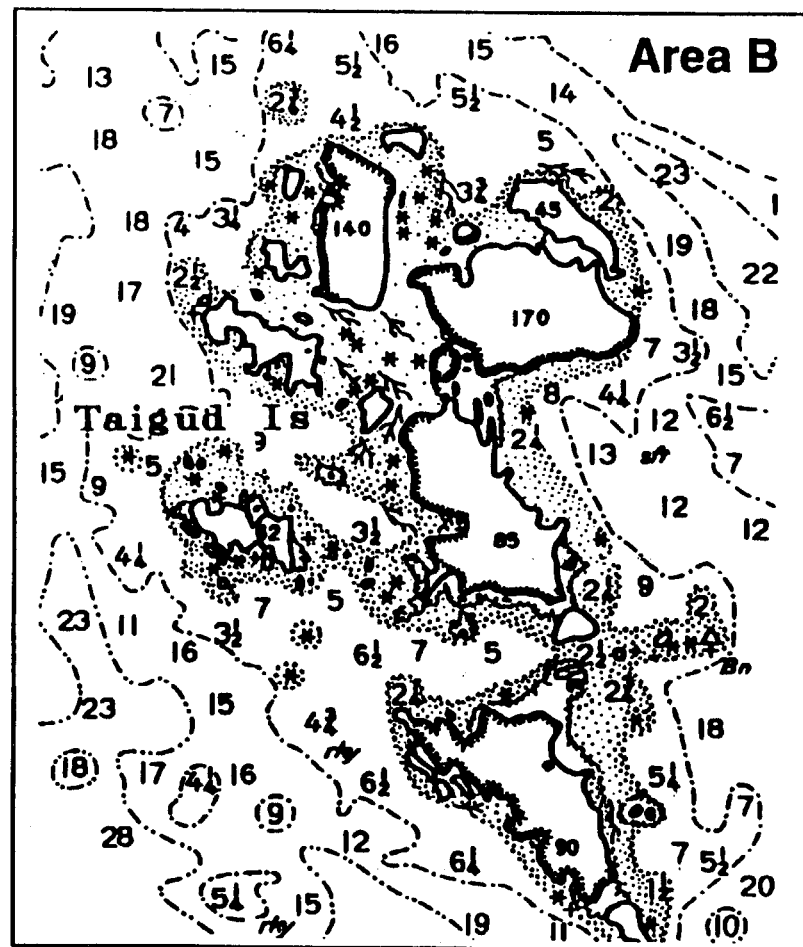
Fish
Ticket
Number

FOR OFFICE USE ONLY

Permit Number

ADF&G No.

#	Month/ Day/ Year	Harvest Location (Bay, Distance to Landmark, Etc.)	Percent of Landing by Location	Bottom Time in Minutes
1				
2				
3				
4				
5				
6				
7				
8				



X

Signature of Permit/License Holder

FOR OFFICE
USE ONLY

Percent Roe Recovery

Subdistrict

Total Pounds From Fish Ticket

Number of Urchins

STATE COPY

Form 11-226 (Rev. 03-92)

Figure 3. Sea urchin harvest log (front page).

Area A

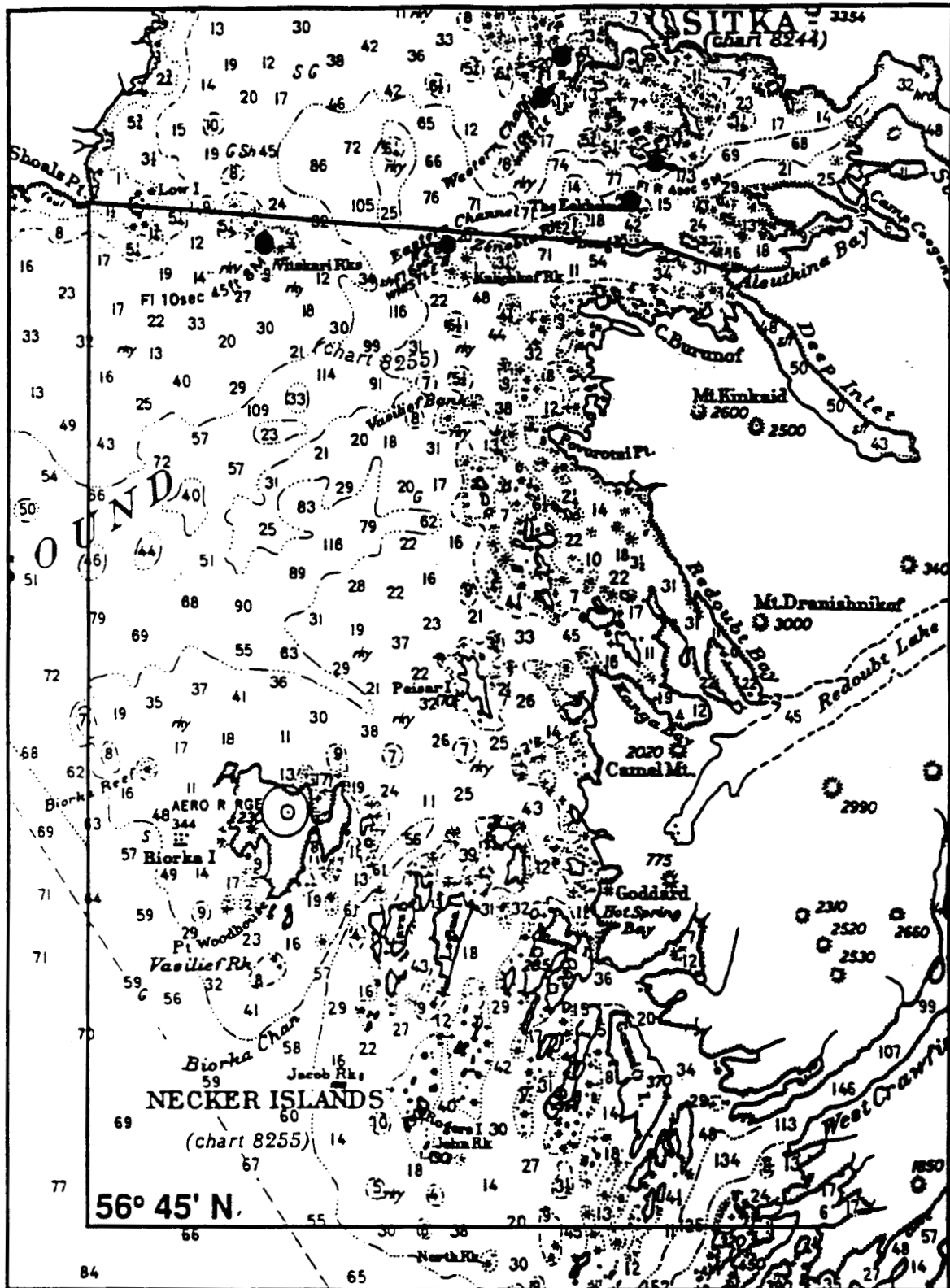


Figure 3. Page 2 of 2 (back page).

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